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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/584,266
Filing Date: June 23, 2006
Appellant(s): IWANAGA ET AL.

Kenneth H. Salen
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed September 8, 2009 appealing from the Final Rejection Office action mailed March 5, 2009 and the Advisory Action mailed June 22, 2009.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

JP 2002124297	Hamamoto et al.	4-2002
US 20040101762	Noh	5-2004
JP 2002313419	Kanekiyo et al.	1-2005
US 20040091780	Kinoshita et al.	5-2004

Copies of the original documents (original text in Japanese) of Hamamoto et al. and Kanekiyo et al. are provided in addition to copies of the Official Translations of these documents.

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 1 & 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hamamoto et al. (JP 2002-124297) in view of Noh (US 2004/0101762).

With regard to claims 1 & 8, Hamamoto et al. teaches a nonaqueous electrolyte secondary battery (paragraphs [0001]-[0002]) comprising a negative electrode constituted of a carbonaceous material (paragraphs [0002], [0011], & [0025]) permitting reversible insertion and desorption of lithium, a positive electrode comprising a lithium metal oxide, such as $LiCoO_2$, $LiMn_2O_4$, or/and $LiNiO_2$ (paragraphs [0002] & [0023]) permitting reversible insertion and desorption of lithium, a separator (paragraphs [0026] & [0028]), and a nonaqueous electrolyte (paragraphs [0017]-[0020]) composed of an organic solvent (paragraphs [0017]-[0019]) with a solute of lithium salt dissolved therein (paragraphs [0020]-[0021]), wherein said nonaqueous electrolyte can contain 0.1-10wt% of di(2-propynl oxalate) (D2PO) by mass relative to the mass of said nonaqueous electrolyte (paragraphs [0016]-[0017]), and vinylene carbonate (VC), dimethyl carbonate (DMC), diethyl carbonate (DEC), methyl ethyl carbonate (MEC) / ethyl methyl carbonate (EMC), and/or ethylene carbonate (EC) (paragraphs [0018]-[0019]), but fails to specifically state the amount of VC used or specifically state the ratio of VC to di(2-propynl oxalate).

Noh teaches the concept of a nonaqueous electrolyte containing 0.1-50wt% of vinylene carbonate (VC) by mass relative to the mass of said nonaqueous electrolyte (paragraphs [0030] & [0039]) in addition to DMC, DEC, MEC/EMC, and/or EC (paragraph [0026]) and a lithium salt (paragraphs [0030]-[0031]) in order to inhibit

swelling at high temperature and to improve cycle life characteristics of the battery (paragraph [00020]).

It would have been obvious to one of ordinary skill in the art at the time of the invention to add the concept of adding 0.1-50wt% of VC of Noh to the nonaqueous electrolyte of Hamamoto et al. in order to inhibit swelling at high temperature and to improve cycle life characteristics of the battery (paragraph [00020]).

While modified Hamamoto et al. fails to specifically state the ratio of VC to di(2-propynl oxalate), one of ordinary skill in the art would understand that because the nonaqueous electrolyte contains 0.1-10wt% of di(2-propynl oxalate) by mass relative to the mass of said nonaqueous electrolyte and contains 0.1-50wt% of VC by mass relative to the mass of said nonaqueous electrolyte, the claimed ratio of VC to di(2-propynl oxalate) of 1:20 to 1:30 is fully encompassed by the ranges taught by modified Hamamoto et al.

Claims 2-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hamamoto et al. (JP 2002-124297) and Noh (US 2004/0101762), as applied to claim 1 above, and further in view of Kanekiyo et al. (JP 2002-313419).

The disclosure of Hamamoto et al. and Noh as discussed above is fully incorporated herein.

With regard to claims 2-6, Hamamoto et al. teaches that the negative electrode active material can be a carbonaceous material (paragraphs [0002], [0011], & [0025]) and that the nonaqueous electrolyte can comprise DMC, DEC, MEC/EMC, and/or EC (paragraphs [0018]-[0019]), but fails to teach the packing density of said negative electrode active material or to specifically state the amount of DEC, and EC used.

Kanekiyo et al. teaches the concept of a carbonaceous negative electrode active material (graphite carbon) having a bulk density of 1.34g/mL (paragraphs [0010] & [0027]) and a nonaqueous electrolyte can comprise 25-40vol% EC, 25-60vol% MEC/EMC, and 10-40vol% DEC (paragraphs [0006], [0011]-[0012], [0029]) in order to increase battery capacity and optimize the ionic conductivity / electric property of said nonaqueous electrolyte (paragraph [0012]).

It would have been obvious to one of ordinary skill in the art at the time of the invention to add the concept of a negative electrode active material having a packing density of 1.34g/mL of Kanekiyo et al. to the battery of modified Hamamoto et al. in order to increase battery capacity (paragraph [0010]). Furthermore, it would have been obvious to one of ordinary skill in the art at the time of the invention to add the concept of a nonaqueous electrolyte containing 25-40vol% EC, 25-60vol% MEC/EMC, and 10-40vol% DEC of Kanekiyo et al. to the nonaqueous electrolyte of modified Hamamoto et al. in order to optimize the ionic conductivity / electric property of said nonaqueous electrolyte (paragraph [0012]).

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hamamoto et al. (JP 2002-124297) and Noh (US 2004/0101762), as applied to claim 1 above, and further in view of Kinoshita et al. (US 2004/0091780).

The disclosure of Hamamoto et al. and Noh as discussed above is fully incorporated herein.

With regard to claim 7, modified Hamamoto et al. fails to teach a metallic case with the specified thickness.

Kinoshita et al. teaches the concept of deploying a nonaqueous secondary battery inside a metallic case, wherein said metallic case can be made from an aluminum alloy sheet having the thickness of 0.5mm or less (paragraph [0034] & claim 2) in order to provide an airtight environment for said nonaqueous electrolyte battery (abstract) and thereby prevent said electrodes and said electrolyte from being exposed to contaminants.

It would have been obvious to one of ordinary skill in the art at the time of the invention to add the metallic case having a thickness of 0.5mm or less of Kinoshita et al. to the nonaqueous secondary battery of modified Hamamoto et al. in order to provide an airtight environment for said nonaqueous electrolyte battery (abstract) and thereby prevent said electrodes and said electrolyte from being exposed contaminants.

(10) Response to Argument

On page 7 of the Appellant's Remarks, Appellant argues that "one skilled in the art at the time of the invention would not have made the asserted combination [of Hamamoto et al. and Noh et al.] because there would have been no expectation of success. In particular, Appellant submits that the references themselves provide reasons for not making the asserted combination" (Appellant's Response, page 7).

The Examiner respectfully disagrees with the Appellant's argument that "one skilled in the art at the time of the invention would not have made the asserted combination [of Hamamoto et al. and Noh et al.] because there would have been no expectation of success. In particular, Appellant submits that the references themselves provide reasons for not making the asserted combination" (Appellant's Response, page 7) because Hamamoto et al. teaches a nonaqueous electrolyte secondary battery comprising a nonaqueous electrolyte (paragraphs [0017]-[0020]) composed of an organic solvent (paragraphs [0017]-[0019]) with a solute of lithium salt dissolved therein (paragraphs [0020]-[0021]), wherein said nonaqueous electrolyte can contain 0.1-10wt% of di(2-propynl oxalate) by mass relative to the mass of said nonaqueous electrolyte (paragraphs [0016]-[0017]), and vinylene carbonate (VC), dimethyl carbonate (DMC), diethyl carbonate (DEC), methyl ethyl carbonate (MEC) / ethyl methyl carbonate (EMC), and/or ethylene carbonate (EC) (paragraphs [0018]-[0019]). Noh teaches the concept of a nonaqueous electrolyte containing 0.1-50wt% of vinylene carbonate (VC) by mass relative to the mass of said nonaqueous electrolyte (paragraphs [0030] &

[0039]), which overlaps the claimed range of VC, in addition to DMC, DEC, MEC/EMC, and/or EC (paragraph [0026]) and a lithium salt (paragraphs [0030]-[0031]) in order to inhibit swelling at high temperature and to improve cycle life characteristics of the battery (paragraph [00020]). One of ordinary skill in the art would understand that because Noh et al. teaches the concept of adding 0.1-50wt% of VC, which overlaps with the claimed amount of VC, to a very similar chemical composition (the nonaqueous electrolyte of Noh et al. and of Hamamoto et al. both contain DMC, DEC, MEC/EMC, and/or EC) in order to inhibit swelling at high temperature and to improve cycle life characteristics of the battery (paragraph [00020]) it would be obvious to combine Hamamoto et al. and Noh et al.

It has been held that "under the correct analysis, any need or problem known in the field of endeavor at the time of the invention and addressed by the patent [or application at issue] can provide a reason for combining the elements in the manner claimed... thus a reference in a field different from that of applicant's endeavor may be reasonably pertinent if it is one which, because of the matter with which it deals, logically would have commended itself to an inventor's attention in considering his or her invention as a whole" (MPEP 2141.01(a)).

On page 8 of the Appellant's Remarks, Appellant argues that it would not have been obvious to add the 0.1-50wt% of VC of Noh to the nonaqueous electrolyte of Hamamoto et al. (Appellant's Remarks, page 8).

The Examiner respectfully disagrees with the Appellant's argument that it would not have been obvious to add the 0.1-50wt% of VC of Noh to the nonaqueous electrolyte of Hamamoto et al. (Appellant's Remarks, page 8) because:

1) Hamamoto et al. teaches that the nonaqueous electrolyte contains VC, but simply fails to state how much VC. The Examiner is not adding the VC of Noh et al. to the nonaqueous electrolyte of Hamamoto et al., but merely using Noh et al. to give motivation to use VC in an amount (0.1-50wt%) which overlaps the claimed amount of VC; and

2) Noh et al. clearly teaches that a nonaqueous electrolyte must contain at least 0.1wt% of VC in order for the effect of VC to be sufficient, and teaches that if the nonaqueous electrolyte contains more than 50wt% VC then the battery performance deteriorates (Noh et al., paragraph [0039]). The fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

Therefore, the Examiner maintains that it would have been obvious to one of ordinary skill in the art at the time of the invention to add the concept of adding 0.1-50wt% of VC of Noh to the nonaqueous electrolyte of Hamamoto et al. for reasons discussed in depth above.

On pages 8-11 of the Appellant's Remarks, Appellant argues that "as a result of the claimed structure of the claimed battery, the battery shows remarkably superior

charge-discharge cycling characteristics at high temperature, and little swelling (Appellant's Remarks, page 8).

The Examiner respectfully disagrees with the Appellant's argument that "as a result of the claimed structure of the claimed battery, the battery shows remarkably superior charge-discharge cycling characteristics at high temperature, and little swelling (Appellant's Remarks, page 8) because the data provided does not provide sufficient evidence of unexpected results. The Examples shown in Table 1 of the Specification (pages 10-11) do not show a magnitude beyond that which is expected because it would be within the scope of an error measurement. Specifically, Practical Example 2 (1% VC, 1.0% D2PO) shows a capacity maintenance ratio of 86% and battery swelling of 5.78mm, while Practical Example 3 (2% VC, 1% D2PO) shows capacity maintenance ratio of 88% and battery swelling of 5.75mm. Comparing these shows a change in capacity maintenance ratio of 2% and shows a change in battery swelling of 0.03mm.

A portion of Table 1 from the Appellant's Specification (pages 10-11) is provided showing Examples and Comparative Examples that are comparative and showing the differences in capacity maintenance (%) and battery swelling (mm) for these Examples and Comparative Examples:

	VC (% by mass)	D2PO (% by mass)	Initial capacity (mAh)	Capacity maintenance ratio (%)	Battery Swelling (mm)
Comparative Example 3	0.0	1.0	780	75	6.05
Comparative Example 5	1.0	0.0	777	85	6.03
Practical Example 1	0.1	1.0	779	80	5.80
Practical Example 2	1.0	1.0	777	86	5.78
Practical Example 3	2.0	1.0	75	88	5.75
Practical Example 4	3.0	1.0	73	90	5.69
Comparative Example 4	4.0	1.0	765	90	5.68
Practical Example 5	1.0	0.1	776	85	5.75
Practical Example 6	1.0	1.0	777	86	5.78
Practical Example 7	1.0	2.0	778	85	5.80
Comparative Example 6	1.0	3.0	776	84	5.90

differences: 10%, 0.02mm

differences: 2%, 0.02mm

differences: 2%, 0.03mm

differences: 2%, 0.06mm

differences: 0%, 0.01mm

differences: 1%, 0.03mm

differences: 1%, 0.02mm

differences: 1%, 0.1mm

Because the Appellant does not provide evidence in the form of an affidavit or declaration under 37 CFR 1.132 that the amount of VC or the ratio of VC : D2PO is critical, and does not provide evidence of unexpected results, the claimed values may be held obvious over the prior art (see *Titanium Metals Corp. v. Banner*, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985)). It has been held that "to establish unexpected results over a claimed range, applicants should compare a sufficient number of tests both

inside and outside the claimed range to show the criticality of the claimed range" (*In re Hill*, 284, F.2d 955, 128 USPQ 197 (CCPA 1960) & MPEPE 716.02(d)(II)). Furthermore, it has been held that "an affidavit or declaration under 37 CFR 1.132 must compare the claimed subject matter with the closest prior art to be effective to rebut a *prima facie* case of obviousness (MPEP 716.02)

On pages 8-9 of the Appellant's Remarks, Appellant argues that "a person of skill in the art would have recognized by reading Noh that it is not the VC in the electrolyte of Noh that reduces swelling of a secondary battery… comparison between Examples 2 and 5 with respect to Thickness variation ratio in Tables 1 and 2 of Noh shows that the VC itself may easily be seen as enhancing swelling, rather than reducing swelling" (Appellant's Remarks, page 9).

The Examiner respectfully disagrees with the Appellant's argument that "a person of skill in the art would have recognized by reading Noh that it is not the VC in the electrolyte of Noh that reduces swelling of a secondary battery… comparison between Examples 2 and 5 with respect to Thickness variation ratio in Tables 1 and 2 of Noh shows that the VC itself may easily be seen as enhancing swelling, rather than reducing swelling" (Appellant's Remarks, page 9) because:

1) It has been held that "disclosed examples and preferred embodiments do not constitute a teaching away from a broader disclosure or nonpreferred embodiments" (MPEP 2123) and that "a known or obvious composition does not become patentable simply because it has been described as somewhat inferior to some other product for

the same use" (MPEP 2123). Furthermore, it has been held that "a reference may be relied upon for all that it would have reasonably suggested to one having ordinary skill the art, including nonpreferred embodiments" (MPEP 2123); and

2) Examples 2 and 5 of Noh are not truly comparable because Example 2 of Noh contains 1 unit of Formula 5 additive and 2 units of Formula 6 additive, while Example 5 contains 2 units of Formula 5 additive, 1 unit of Formula 6 additive, and 1 unit of VC. Furthermore, Comparative Example 1 contains no VC and shows a 0.54% thickness variation ratio, while Comparative Example 2 contains 2 units of VC and shows a 0.50% thickness variation ratio. Comparison of Comparative Examples 1 & 2 clearly shows that the addition of VC does not increase swelling, but rather shows a slight decrease in swelling.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/C. L. R./

Examiner, Art Unit 1795

Conferees:

/Dah-Wei D. Yuan/

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